considered severely degenerated. Two independent readers performed histological scoring of the PCLs (Inter-observer class coefficient = 0.87). PCL scores were compared to ACL scores from same knees.
Results: All knees had an intact, non-ruptured PCL. PCL grade: 76% of the knees showed a mild PCL degeneration; 12%, moderate; and 9%, severe. Fiber disorientation was the most prevalent and severe change (1.2±0.66) followed by mucoid denegation (0.84±0.77), chondroid metaplasia (0.81±0.73), cystic changes (0.54±0.87), and inflammation (0.46±0.66). All criteria showed strong correlations to the total PCL score (range r=0.5-0.76), the highest being mucoid degeneration. Comparison of histological grades of PCL and ACL showed a close relationship with the exception that significantly fewer PCL than ACL were in the "severe" group (Figure 1). There was lower correlation between total histological PCL scores and aging (R=0.29) compared to ACL scores and aging (r=0.45). ACL scores correlated well with total cartilage scores (r=0.56) while PCL scores increased with severity of OA from grades 0 to III but not between OA grades III to IV (r=0.31, Figure 2). In knees with ruptured ACL, the PCL scores correlated with the cartilage score of the lateral compartment (femur r= 0.65, tibia r= 0.57).
Conclusions: Significant percentages (~ 25%) of patients with OA have a deficient ACL, while all PCL were macroscopically intact with weak correlations between PCL degeneration and aging. PCL histological scores were lower in knees with grade IV compared to grade III cartilage suggesting that the PCL is at lower risk for acute or chronic injury than the ACL. The PCL has a significantly different pattern of degeneration. The lack of correlation with age or OA grade indicates independent pathways for PCL versus ACL degeneration.

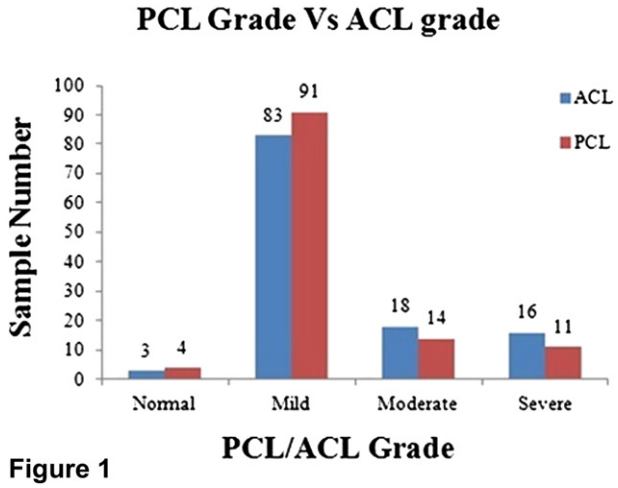

Figure 1

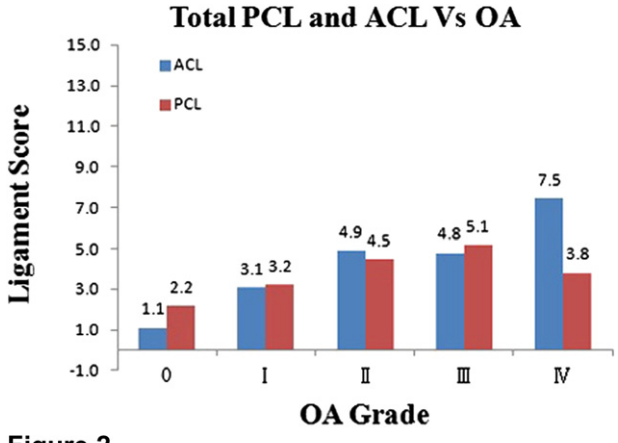

Figure 2

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A NEW METHOD TO MEASURE ANATOMIC KNEE ALIGNMENT: A TOOL FOR LARGE STUDIES OF OA?

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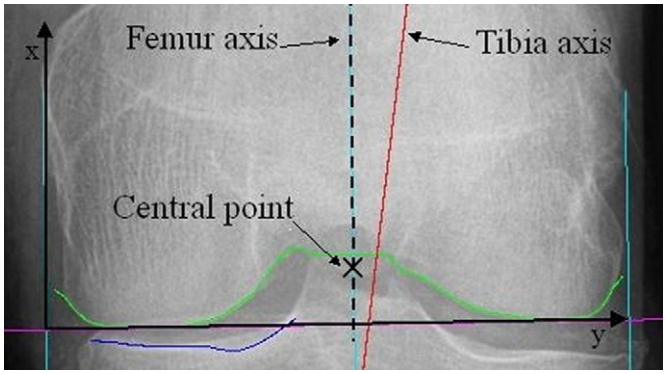
Purpose: Knee malalignment alters load distribution across the articular surface and is a potent predictor of knee osteoarthritis (OA) progression. The hip-knee-ankle angle (HKA) provides the most direct measurement of biomechanical leg alignment, but requires a long-limb radiograph. The femorotibial alignment angle (FTA) of the knee joint is an indirect measure of mechanical alignment but can be performed using a standard knee radiograph. Traditional methods of measuring the FTA require a reader to identify landmarks in the tibial spines, which can be difficult and unreliable for abnormally positioned knee images. We have developed and validated a new software method to rapidly determine FTA that may expedite the measurement of knee radiographs from large studies such as the Osteoarthritis Initiative (OAI).
Methods: The method is based on the coordinate system developed for location specific joint space width (JSW) measurements, previously used to demonstrate that quantitative radiographic measures are comparable with MRI for detecting OA progression. The coordinate system directly determines the orientation of the femur (Figure 1) and also defines a central point of the knee. The axis is perpendicular to a line tangent to the base of the femoral condyles, and centered between the outer aspects of the condyles. Four points on margins of the tibial shaft define the axis of the tibia. Two points are marked 10 cm from the center point and two are placed 1 cm from the base of the tibial plateau. The study used subjects from the Progression Cohort of the Osteoarthritis Initiative (OAI) (OAI Datasets 0.1.1, 0.B.1, and 1.B.1) where HKA measurements were available from the OAI. We excluded images where the center of the knee was less than 10 cm from the lower edge of the image, leaving 266 total knees from 142 subjects for the final analysis.
The study used two readers. Reader 1 read the data twice with the new procedure and two times using a traditional method. Reader 2 performed a single reading with each of the two methods. Linear regression analysis was used to assess reader reproducibility, and correlation with the HKA measurement.
Results: Table 1 provides the results comparing the two methods. The new method of measuring FTA was related to HKA by FTA = 0.52HKA - 4.7 degrees. The traditional method was related to HKA by FTA = 0.65HKA + 1.5 degrees. The additional reader time was less than 30 seconds per image once an image had been processed for the location-specific JSW measurement.
Conclusions: We found improved inter and intra reader reproducibility compared with the traditional method and higher correlation with the HKA. With the new method, very little difference was observed between the inter and intra reader precision suggesting a robust technique. The fast reader time implies that assessment of large numbers of subjects is feasible. Furthermore, the method does not require landmarks placed in the tibial spines; it can be performed by a relatively unskilled reader whose task is limited to marking points on the shaft of the tibia and the femoral condyles. A limitation of the method is that it relies on the coordinate system set up for location specific JSW; additional time is necessary if this step has not already been performed. However, setting up the coordinate system is substantially automated and could be performed independent of measuring JSW if necessary. In summary, we have documented a new technique that can provide a precise, accurate, rapid and reproducible measurement of radiographic knee anatomic alignment, with significant implications for efficiency and cost-effectiveness for very large studies of knee OA.

	Intra-reader	Inter-reader	Correlation with HKA
Traditional Method	0.92	0.85	0.46
New Method	0.97	0.96	0.51

Table 1. R squared values from a linear regression fit.



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RETURN TO WORK AND WORK ACTIVITY LIMITATIONS FOLLOWING TOTAL HIP AND KNEE REPLACEMENT

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Purpose: Total hip (THR) and knee (TKR) replacement increasingly are performed in middle-aged individuals making return to work (RTW) a salient outcome. This research describes the characteristics of individuals with early and later return to work following THR and TKR. Additionally, at work limitations pre-surgery and upon returning to work and factors associated with workplace limitations were evaluated.
Methods: 190 THR (males = 100; female = 90; mean age = 56 yrs, sd=9.9) and 170 TKR (males = 72; female = 98; mean age = 57 yrs, sd=7.2) of a total 931 cohort participants were eligible for the study (i.e., those working or on short-term disability pre-surgery). They completed questionnaires pre-surgery and one, three, six and twelve months post-surgery that included socio-demographics (age, sex, BMI, education, marital status and job status i.e., full- or part-time, short-term disability), job sector (business/administration, health/science/arts, sales and service, and trades/transportation/manufacturing), occupational physical demand (low, high and unable to determine), and the Workplace Activity Limitations Scale (WALS), a 12-item measure where respondents rate how much difficulty they experience carrying out work-related activities unassisted (score range 0-36 with lower scores indicating few limitations). Additionally, the WOMAC pain and function subscales were completed.
THR and TKR were analyzed separately and all standardized measures were recoded, as necessary, so that lower scores represented no problems. In addition to descriptive statistics for the sample, the proportion of people working was calculated for each time interval. The association of age, sex, BMI, education, job sector and job demands with early (1 month) versus later (6 and 12 month) RTW was examined using ANOVA for continuous variables and polychoric correlations for categorical data.
Results: 166 (87%) and 144 (85%) respondents RTW by twelve months following THR and TKR, respectively. Overall, people with THR (34%) returned to work earlier than those with TKR (23 %). Early RTW was associated with older age, male gender, university education, working in business/administration, and low physical demand work. For both groups, work limitations were significantly less than pre-surgery by one-year follow-up (pre-surgery: THR 12.6, TKR = 13.3; one-year post-surgery: THR=4.14, TKR=5.90). In THR, limitations upon RTW were similar irrespective of time of RTW, while for TKR, those with later return reported fewer limitations than those who returned early. WOMAC pain and function scores were associated with the WALS with Pearson r ranging from 0.53 to 0.78 for THR and from 0.53 to 0.75 for TKR.
Conclusions: Overall, a high proportion of individuals, including workers in older age groups, return to work following THR or TKR although time of return is slightly later in TKR. Information on factors associated with time of return and the types of limitations experienced is valuable for clinicians in educating patients about the course of recovery.

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BODY FAT AND LEAN MASS HAVE OPPOSITE EFFECTS ON LOSS OF KNEE CARTILAGE AND INCREASE IN KNEE PAIN IN OLDER ADULTS: A PROSPECTIVE COHORT STUDY

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Purpose: The associations between body fat, lean mass and loss of cartilage volume and increase in knee pain over time are uncertain. This study aimed to determine if body fat measures and lean mass are associated with loss of knee cartilage and increases in knee pain over time in old adults.
Methods: A total of 755 randomly selected subjects (mean 62 years, range 51-81, 50% female) were studied at baseline, 2.6 and 5 years later. Knee pain (on flat surface, going up/down stairs, at night, sitting/lying and standing upright) at baseline and 5 years was assessed using WOMAC. Fat mass and lean mass (both in kg) were measured by a Hologic Delphi dual X-ray absorptiometry (DXA) scanner. Fat-suppressed MRI of the right knee was performed to determine knee cartilage volume and tibial bone area at baseline and 2.9 years in first 395 subjects. Height, weight and radiographic osteoarthritis (OA) were measured by standard protocols.
Results: Tibial cartilage volume decreased by 2.0-2.7% per annum over 2.9 years. In multivariable analysis, annual change in medial cartilage volume was negatively and significantly associated with body mass index (β: -0.14% per kg/m2, 95%CI: -0.25%, -0.02%), percentage total body fat (β: -0.19% per %, 95%CI: -0.30%, -0.07%), percentage trunk fat (β: -0.10% per %, 95%CI: -0.19%, -0.02%), and positively associated with percentage lean mass (β: 0.20% per %, 95%CI: 0.08%, 0.32%). Change in lateral tibial cartilage volume was also significantly associated with percentage total body fat (β: -0.11% per %, 95%CI: -0.21%, -0.001%) and total lean mass (β: 0.13% per kg, 95%CI: 0.04%, 0.22%). These were independent of sex and age even though both were also significant predictors.In multivariable analysis, increase in total knee pain score over 5 years was significantly and positively associated with weight (OR = 1.03 per kg, P<0.001), body mass index (OR=1.07 per kg/m^2, P=0.004), percentage total body fat (OR = 1.05 per %, P=0.019), percentage trunk fat (OR = 1.05 per %, P=0.007), waist-hip ratio (OR=32.72, P=0.012) and waist circumference (OR=1.03 per cm, P<0.001), but negatively associated with percentage lean mass (OR=0.96 per %, P=0.009).
Conclusions: Body fat adversely effects tibial cartilage loss and knee pain over time, while lean mass is protective. Strategies aimed at reducing body fat but increasing lean mass may reduce knee cartilage loss and relieve knee pain in older people.

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WEIGHT LOSS IS NOT ASSOCIATED WITH A REDUCTION IN THE RATE OF DECLINE IN JOINT SPACE WIDTH IN SUBJECTS WITH SYMPTOMATIC RADIOGRAPHIC KNEE OSTEOARTHRITIS: DATA FROM THE OSTEOARTHRITIS INITIATIVE

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Purpose: Obesity is a major risk factor for the development and progression of knee osteoarthritis (OA) and weight loss is recommended as part of the nonpharmacologic management of overweight patients with knee OA. We previously reported, using data from the Osteoarthritis Initiative (OAI), that weight loss over 24 months was associated with improvement in both self-reported and performance measures of physical function, although it was not associated with a reduction in knee pain (Arthritis Rheum 2009;60[10,Suppl]:S206). The current analysis tested the hypothesis that weight loss would be associated with a reduction in the rate of decline in minimum joint space width (mJSW) in subjects with symptomatic radiographic knee OA.